

## SCOPE OF WORK

The California Department of Water Resources (DWR) has initiated the Delta Risk Management Strategy (DRMS) to investigate the risk to assets of statewide interest resulting from levee failures in the Delta and Suisun Marsh areas of California.

There are proximately 1,115 miles of levees protecting 700,000 acres of lowland in the Sacramento-San Joaquin Delta. In the Suisun Marsh, there are approximately 230 miles of levees protecting over 50,000 acres of marshland. Many of these levees are old, and were not built to today's standards of levee design. California has an immense interest in maintaining many of the Delta levees, in part, because the Delta is a source of drinking water for about two out of every three Californians.

DRMS will look at the potential impacts on water supplies and other assets of statewide interest from levee failure in the Delta based on a 50-year, 100-year, and 200-year projection for each of the following possible impacts: subsidence, earthquakes, flood, climate change, sea level rise, and any combination of these impacts. DRMS is scheduled to be presented to the state legislature no later than January 1, 2008. In order to meet that date, a final draft of the DRMS work must be submitted for review in the summer of 2007.

The goals of DRMS are:

- A. Evaluate the risk and consequences to the State (e.g., water export disruption and economic impact) and the Delta (e.g., levees, infrastructure, and ecosystem) from the failure of Delta levees and the risk to other assets considering their exposure to all hazards (seismic, flood, subsidence, seepage, sea level rise, etc.) under present as well as foreseeable future conditions. The evaluation will assess the total risk as well as a de-aggregation of the risk for individual islands.
- B. Propose an acceptable risk criterion for consideration of alternative risk management strategies and for the State's use in management of the Delta, including the implementation of risk-informed policies.
- C. Develop a Delta Risk Management Strategy, including a prioritized list of actions to reduce and manage the risks of consequences associated with Delta levee failures.

To perform the DRMS efforts, DWR has selected URS Corporation, from Oakland, California. URS Corporation has assembled an impressive list of sub-consultants, most of them from Northern California, who have an extensive history and knowledge of the Delta. In addition to our consultant team, DRMS has both a Technical Advisory Committee (TAC), comprised of technical area experts from academia, other agencies,

and consulting firms, and a Steering Committee (SC). The role of the TAC is to review interim work products, provide written comments, and advise if the methods used are appropriate. The SC members are policy advisors that represent various Delta interests.

Currently the DRMS program is separated into two phases.

Phase 1 of DRMS focuses on trend analysis and risk analysis, with the result of this phase of work being the probability of economic and environmental damages under a "business as usual" scenario. This phase of work is scheduled to be completed in January 2007.

Phase 2 is the risk reduction phase where the contractor will be investigating risk reduction measures based on the results of the Phase 1 work. Phase 2 is expected to be completed in July 2007.

In order to achieve the Delta Risk Management Strategy, the URS team has decided to prepare White Papers for the following topic areas:

1. Seismic Hazard
2. Flood Hazard
  
3. Climate Change
4. Subsidence
5. Levee Fragility
6. Emergency Response
7. Hydrodynamics
8. Wave Action
9. Water Operation
10. Geomorphology
11. Ecosystem
12. Economics
13. Risk Analysis Methodology for the Delta and Suisun Marsh

These White Papers will describe the methodology to perform a problematic analysis in a manner that is consistent with the overall DRMS risk analysis framework.

An Independent Science Board (ISB) would need to assemble a multidisciplinary committee of experts, comprised mainly of engineers and scientists, who will provide a high-level independent review and issue findings and recommendations based on the work of the URS team, and other information deemed relevant to meeting the goals of the DRMS.

DWR anticipates that the ISB would:

1. Prepare a plan, schedule, and cost estimate to conduct the proposed review.

2. Propose a list of names and alternates to conduct the review, subject to approval by the Department of Water Resources.
3. Interact as needed with the URS team, TAC and SC members, the State of California Department of Water Resources and Department of Fish & Game, California Bay-Delta Authority, the U.S. Army Corps of Engineers, Sacramento District officials, other involved agencies, the general public and other organizations, as determined appropriate to obtain information.
4. Review the methods, analyses, and findings, as well as the overall activities, being undertaken by the URS team, and, if appropriate, recommend additional efforts to the extent possible to enhance the value of their efforts.
5. On the assumption that the DRMS Phase I and Phase 2 reports will be delivered to the ISB on the schedules noted above, the ISB will evaluate and report first on the phase 1 results in approximately March or April 2007 and subsequently on phase 2 by approximately October or November 2007. ISB reports to the Department will be short and constructively critical, with focus on assuring the highest quality treatment of data gathering, technical analysis, and presentation for decision makers. The committee will likely consider risks to population, water resources and services, the economy, and environmental resources in reviewing the DRMS documents. Report on the findings and recommendations, as appropriate, regarding the conduct and results of the DRMS work.

The review will be conducted by a multidisciplinary committee of specially appointed experts. The committee will include members who are selected expressly for their expertise in the relevant scientific issues at hand. In this case, the committee will be constituted so as to include experts in environmental, civil, hydraulic, earthquake, and geotechnical engineering; hydrology, geomorphology, coastal hydrodynamics, and atmospheric science; ecology; risk and decision analysis; economics; infrastructure analysis; and engineering management. The committee will be formed in the context of the ISB's normal concerns for conflict of interest and bias to ensure a balanced and objective review. It will also reflect other objectives of achieving diversity in terms of age, gender, geographical distribution, and other factors.

Scientific objectivity and rigor are also ensured by the extensive independent, external review process carried out by the ISB. The purpose of the ISB review is to assist the DRMS authors in making their report as accurate and effective as possible and to ensure that the DRMS authors and the ISB are creditably represented by the report published under their names.

The ISB shall include in their proposal the expected number of meetings they expect to be held during the study period. Meetings could be held for the purpose of: having briefings by DRMS team members, to acquire information on the DRMS, meet with various DRMS team members and partner agencies, and visit relevant sites.

Additionally, the ISB shall engage regularly with DWR and its Partner agencies to discuss study plans, address questions, deliver quarterly progress reports on the activities of the ISB, and gather necessary data and information that will help facilitate the committee's work. DWR and its Partner agencies will appoint liaisons who will be expected to attend open sessions of committee meetings, make formal presentations at the first meeting and subsequently upon request, and to act as information resources to the ISB. This will allow for rapid clarification and communication of issues and provide continuity of effort among all agencies throughout the study.

### ANTICIPATED RESULTS

Besides the quarterly reports mentioned above, the ISB's work will result in two formal reports to the Department that should be useful to the DRMS team and others in helping assure that their work is based on the best possible science and technology. Reports will be peer reviewed in accordance with the procedures established by the ISB. Reports will be made available to the public without restriction and will be prepared in sufficient quantity to ensure distribution to the public and all relevant parties. Appropriate dissemination activities will be held upon completion of each report, including briefings of the DRMS team and others, as appropriate.



### ESTIMATE OF DURATION AND COSTS

The duration of this effort will be 15 months, October 1, 2006 through December 31, 2007. We would appreciate your plan and estimate of cost to conduct the requested review.